

REMARKS

Claims 1-8 are pending in this application. Claim 1 has been amended to clarify the claimed subject matter and to positively recite that the “cooled hydrotreated effluent” is contacted with “a hydrotreating catalyst at conditions being effective for conversion of polyaromatic hydrocarbons to monoaromatic compounds.” No new matter has been introduced.

Claims 1, 3, and 5-8 are rejected under 35 U.S.C. § 102 as being anticipated by Kelley et al. (U.S. Patent No. 4,040,944) (“Kelley”). This rejection is respectfully traversed.

The claimed invention relates to a process for reducing content of sulphur compounds and polyaromatic hydrocarbons in a hydrocarbon feed stock. As such, amended independent claim 1 recites a “process for reducing content of sulphur compounds and polyaromatic hydrocarbons in a hydrocarbon feed stock” by *inter alia* “contacting the feed stock with hydrogen over a hydrotreating catalyst at conditions being effective for hydrotreating and obtaining a hydrotreated effluent” and “cooling the hydrotreated effluent.” Amended independent claim 1 also recites “contacting the cooled hydrotreated effluent with a hydrotreating catalyst at conditions being effective for conversion of polyaromatic hydrocarbons to monoaromatic compounds” and “introducing the hydrotreated effluent from step (c) into an FCC unit for producing gasoline.”

Kelley relates to a method of manufacturing catalytic cracking charge stocks by hydrocracking. According to Kelley, charge stock containing a relatively large proportion of heavy hydrocarbons boiling above about 800° F is produced by first subjecting a raw feedstock boiling predominantly above 600° F and containing a substantial proportion of material boiling above 800° F to catalytic hydrofining followed by catalytic hydrocracking at high pressures. (Abstract). Kelley teaches that the hydrocracking catalyst and conditions “are chosen so as to achieve selective conversion of material boiling between about 600° F and 800° F to lower boiling materials with a relatively minor conversion of the 800° F +

material.” (Abstract). In this manner, “[t]he resulting product boiling above 400° F is rich in 800° F + material, and constitutes an excellent catalytic cracking charge stock.” (Abstract).

Kelley does not disclose all limitations of claims 1, 3 and 5-8. Kelley fails to teach or suggest a “process for reducing content of sulphur compounds and polyaromatic hydrocarbons in a hydrocarbon feed stock” by *inter alia* “contacting the feed stock with hydrogen over a hydrotreating catalyst at conditions being effective for hydrotreating and obtaining a hydrotreated effluent” and “*cooling the hydrotreated effluent*,” as amended independent claim 1 recites (emphasis added). Kelley teaches a dual-step process of subjecting a raw feedstock boiling predominantly above 600° F and containing a material boiling above 800° F to catalytic hydrofining followed by catalytic hydrocracking at high pressures. Kelley is silent, however, about “*cooling the hydrotreated effluent*” subsequent to “contacting the feed stock with hydrogen . . . for hydrotreating and obtaining a hydrotreated effluent” and before “contacting the *cooled* hydrotreated effluent with a hydrotreating catalyst at conditions being effective for conversion of polyaromatic hydrocarbons to monoaromatic compounds,” as amended independent claim 1 recites (emphasis added).

In the Advisory Action dated September 4, 2003, the Examiner notes that “Kelly discloses that the process can be operated without intervening cooling, condensation, or separation of ammonia and hydrogen sulfide.” (Office Action at 2). The Examiner also asserts that “Kelley also discloses that an intervening treatment of the hydrofiner effluent can be performed to remove ammonia and hydrogen sulfide.” (Office Action at 2). The Examiner then concludes that “[o]ne of ordinary skill in the art reading these two sections would realize that an intervening cooling step can be applied” and that “the disclosure that the hydrocracker can be operated at substantially reduced temperatures indicates that cooling can be performed.” (Office Action at 2).

Applicant respectfully disagrees with the Examiner’s position that the statement in Kelley that the hydrocracker is “operated at substantially reduced temperatures” meets

the steps of “cooling the hydrotreated effluent” and “contacting the cooled hydrotreated effluent with a hydrotreating catalyst” of the claimed invention. First, the term “operated at substantially reduced temperatures” simply denotes that the hydrocracker 12 may be operated at lower temperatures, as part of the “[m]any variations in the . . . processing scheme” contemplated by Kelley. (Col. 6, lines 25-36). The term “operated at substantially reduced temperatures” of Kelley does not disclose or suggest the active steps of “cooling the hydrotreated effluent” and “contacting the cooled hydrotreated effluent with a hydrotreating catalyst at conditions being effective for conversion of polyaromatic hydrocarbons to monoaromatic compounds,” as specifically recited in amended independent claim 1 of the present application. In Kelley, there is no mention about “cooling the hydrotreated effluent,” much less about “contacting the *cooled* hydrotreated effluent with a hydrotreating catalyst,” as in the claimed invention (emphasis added).

Second, Kelley specifically teaches against the intermediate cooling step. Kelley emphasizes that “total effluent from hydrofiner 10 is transferred to hydrocracker 12 via line 14, *without intervening cooling*, condensation or separation of ammonia and hydrogen sulfide generated in the hydrofiner.” (Col. 4, lines 26-30; emphasis added). In fact, in exemplifying the first step of manufacturing its catalytic cracking charge stocks, Kelley lists both the temperatures of the hydrofining and hydrocracking steps as constant, that is, a “broad range” of 650-875°F and a “preferred range” of 725-850°F. (Col. 4, lines 8-10; lines 38-40). Thus, it is clear that no intervening cooling step occurs between the hydrofining and hydrocracking steps of Kelley.

Third, the Examiner’s assertion that “[o]ne of ordinary skill in the art reading these two sections [of Kelley] would realize that an intervening cooling step can be applied” is wrong. (Office Action at 2). As noted above, Kelley teaches a constant temperature range of 650-875°F for its hydrofining and hydrocracking steps. This is because, in outlining the problems of the prior art non-hydrogenative catalytic cracking systems, Kelley specifically notes that “[i]f a feedstock boils over a wide range of say 400° to 1000°F, it is difficult to select a cracking temperature which is optimum for all

hydrocarbon fractions in the feed.” (Col. 1, lines 24-27). For example, “[i]f high cracking temperatures are utilized in order to maintain adequate conversion of the lower boiling fractions, the higher boiling fractions then tend to produce inordinate amounts of coke and light gases.” (Col. 1, lines 27-31). Similarly, “if low temperatures are employed . . . then conversion of the lower boiling fractions is reduced, resulting in low overall conversions per pass and high recycle rates.” (Col. 1, lines 31-35). Accordingly, one skilled in the art would not have been motivated to modify the temperature of the hydrocracker of Kelley or to operate the hydrocracker of Kelley at substantially lower temperatures, as the Examiner asserts.

For at least these reasons, Kelley fails to teach or disclose all limitations of independent claim 1, and withdrawal of the rejection of claims 1, 3 and 5-8 is respectfully requested. The rejection of claims 2 and 4 is also traversed for at least the reasons above. In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

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